

Epidemiological Investigation of a Large Mpox Outbreak in the Western Region of Ghana, 2025

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Abstract

Background

Mpox, a member of the *Orthopoxvirus* genus in the Poxviridae family, is a zoonotic disease caused by the monkeypox virus (MPXV), with an incubation period spanning 5 to 21 days. Internationally, it is known to spread within sexual networks, particularly among men who have sex with men (MSM). On 12 May 2025, the first case of Mpox was recorded in the Western Region of Ghana, triggering an intense outbreak in the region. We investigated this outbreak to understand and determine its magnitude in the Western Region of Ghana.

Methods

A cross-sectional study was conducted from May to December 2025. Suspected, probable, and confirmed cases were identified through enhanced surveillance, record reviews, and contact tracing. Cases were confirmed by Real-Time PCR using WHO-supplied reagents for local testing.

Results

Of the 1,060 suspected Mpox cases, 37.55% (398/1,060) were laboratory-confirmed. The outbreak was propagated, lasting 29 epidemiological weeks with multiple peaks. Most confirmed cases were adults aged 18–45 years (75.63%), with a majority being males (52.26%). Over 70% of cases were concentrated in three urban districts (Sekondi-Takoradi, Tarkwa-Nsuaem, Wassa-Amenfi East). Three fatalities were recorded, resulting in a case fatality rate (CFR) of 0.75%.

Conclusion

This investigation revealed a prolonged mpox outbreak in the Western Region of Ghana, concentrated among working-age men in urban areas. While vaccination ultimately reduced virus transmission, a significant delay in response highlights the need for improved surveillance, rapid response measures, and sustained community engagement to prevent future outbreaks.

Introduction

Mpox (formerly monkeypox) is a zoonotic disease caused by the monkeypox virus (MPXV), a member of the *Orthopoxvirus* genus in the *Poxviridae* family [1, 2]. This disease was first identified in laboratory monkeys in 1958 and later in humans in 1970 in the Democratic Republic of Congo [3–5]. Mpox has historically been endemic to Western and Central Africa [6]. The mpox virus is classified into two distinct genetic clades: Clade I (formerly known as the Congo Basin clade), associated with a higher fatality rate, and Clade II (formerly known as the West African clade), which is associated with a lower fatality rate [7,

8]. The global outbreak that began in 2022, which is predominantly driven by Clade IIb, represented a significant epidemiological shift, with sustained human-to-human transmission occurring in non-endemic countries [6, 7, 9, 10]. By June 2024, the global case count for the 2022–2023 outbreak had reached 97,281 across 118 countries. [11]. This prompted the World Health Organisation (WHO) to declare Mpox as a “Public Health Emergency of International Concern (PHEIC)” in July 2022 and again in August 2024 due to a resurgence driven by a new, more transmissible Clade Ib variant [12].

Mpox transmission occurred primarily through zoonotic spillover from animal reservoirs (particularly rodents) to humans through direct contact with infected animals, consumption of bushmeat, or contact with contaminated materials [1, 7]. However, the 2022–2023 global outbreak demonstrated a dramatic shift toward sustained human-to-human transmission through close physical contact [11]. A significant driver of the international spread was transmission within sexual networks, particularly among men who have sex with men (MSM) [6, 13, 14]. This shift challenged previous assumptions and necessitated revised public health strategies. MPXV infection has an incubation period typically spanning 5 to 21 days [15], with clinical presentation characterised by fever, headache, muscle aches, back pain, lymphadenopathy, and a progressive rash [7, 16]. Complications can include secondary bacterial infections, pneumonia, encephalitis, and ocular involvement.

The literature identifies several key comorbidities that increase the risk of severe mpox outcomes, with advanced HIV-associated immunosuppression being the most critical factor [17]. Evidence consistently indicates that individuals with HIV, particularly those with CD4 counts below 200 cells/ μ L, face a significantly high risk of severe, necrotising disease and mortality, with studies reporting case fatality rates as high as 20.8% in co-infected patients in endemic settings [18–20]. Beyond HIV, other conditions associated with immune compromise, such as organ transplantation, active cancer, or autoimmune diseases with an immunodeficiency component and old age, are recognised as risk factors for severe disease [19]. Other studies suggest that metabolic comorbidities (hypertension, diabetes, hyperlipidaemia, etc.) may also be associated with a higher likelihood of mpox infection and may also increase the severity of the mpox disease and its outcomes, with potential additive interactions with HIV infection. However, more confirmatory research is needed [20].

Africa has borne the historical burden of Mpox [1, 21]. Ghana represents a particular paradox in Mpox epidemiology. Although the country had no confirmed human cases before 2022, it was implicated in the 2003 U.S. outbreak, which was traced to rodents exported from Ghana [12]. Ghana reported its first human cases in May 2022 [10]. A recent serological study analysing pre-2022 samples found an overall Mpox virus (MPXV) antibody prevalence of 6.6% in Ghana, with participants from the Western Region having substantially 6.7 times increased odds of seropositivity (95% CI: 1.75–25.62) [12] compared to other regions. This critical finding suggests that localised MPXV circulation or repeated zoonotic spillover occurred undetected in Ghana, and specifically in the Western Region, long before the 2022 outbreak was recognised [12].

On 12 May 2025, a 31-year-old male small-scale miner presented to Tarkwa Municipal Hospital in the Tarkwa-Nsuaem district in the Western Region of Ghana. His symptoms, which began on 4 May, included a pronounced rash, inguinal lymphadenopathy, fever, generalised body aches, and cough. A sample collected on 12 May was confirmed as mpox virus (Clade II) by the National Public Health and Reference Laboratory. This individual, a private-sector worker with no reported international travel or known contact with a symptomatic person, represented the first laboratory-confirmed case in what would become a sustained regional outbreak. The regional health directorates notified the National Disease Surveillance Department of the Ghana Health Service. The surveillance team launched an investigation to understand the epidemiological characteristics of the Mpox in the region, identify the cause of the outbreak, determine its magnitude, and implement public health control measures.

Materials and Methods

Study Design

To assess the extent, spread and distribution of the Mpox outbreak in the Western Region of Ghana, we conducted a cross-sectional survey from 4th May to 2nd December 2025.

Outbreak setting

The outbreak occurred in the Western Region of Ghana. The Western Region, covering approximately 13,842 km² of land, is characterised by various ecological zones, including tropical rainforests and coastal areas. It shares borders with Côte d'Ivoire to the West, the Central Region to the East, and the Western North Region to the north. The region has 14 administrative Metropolitan, Municipal and District assemblies (Fig. 1). According to the 2021 population and housing census, the region has a population of approximately 2,060,585 [22]. There are significant economic activities, including mining, cocoa farming, oil production, and commercial fishing. The Regional capital, Sekondi-Takoradi, is a major industrial hub, while districts such as Tarkwa-Nsuaem are centres for mining activity. These activities encourage population mobility and establish interfaces for disease transmission.

Study population

The study population for this outbreak investigation includes individuals with suspected, probable, or confirmed mpox cases, classified by clinical and laboratory criteria. This also involves close contact with family members, co-workers, classroom mates, or institutions identified as hotspot areas.

Case Definition

The following national standard case definitions for mpox, adapted from WHO guidelines, were used for this investigation.

Suspected Case: Any person presenting with an acute rash *and* one or more of the following signs/symptoms: headache, acute onset of fever ($> 38.5^{\circ}\text{C}$), lymphadenopathy, myalgia, back pain, or profound weakness (asthenia) from May 12, 2025, in the Western Region.

Probable Case

A suspected case with an epidemiological link (face-to-face contact, physical contact, or contact with contaminated materials) to a confirmed or probable case within 21 days before symptom onset.

Confirmed Case

A suspected or probable case with a clinical specimen (lesion swab or crust) testing positive for mpox virus DNA by real-time polymerase chain reaction (Real-Time PCR) at any Public Health and Reference Laboratory.

Case search and Data collection

To ensure comprehensive case identification and determine the magnitude of the outbreak, a multimodal case-search strategy was implemented, combining passive surveillance, retrospective record review, and community engagement. A retrospective facility-based clinical record review was conducted across the region. Teams of trained surveillance officers reviewed outpatient, inpatient, and laboratory registers from 14th April 2025 (21 days before the first suspected case was recorded on 4th May 2025) to 27th November 2025. Search terms included: "acute rash," "fever with rash," "lymphadenopathy," and "suspected mpox/chickenpox." This review aimed to identify cases that may have occurred before the confirmation of the index case. A line list was then created, including details of all suspected/probable cases found in the region.

Community-based surveillance and contact tracing were also conducted. For each laboratory-confirmed case, a contact list was generated. Close contacts (household members, sexual partners, healthcare workers without appropriate PPE) were actively monitored for 21 days from the last exposure date. Community Health Nurses and Volunteers in affected sub-districts were sensitised to report any community members presenting with a febrile rash illness.

An official alert and the Mpox case definition were circulated to all public and private health facilities in the region's 14 districts. Reporting was made mandatory, requiring immediate notification of any suspected case to the District and Regional Health Directorates.

A clinician assessed all individuals identified through the mechanisms described above. A standard case investigation form was completed for each, capturing:

- Demographic details (age, gender, occupation, location)
- Clinical presentation and history

- Epidemiological links (travel, contact with similar illness, animal exposure)
- Laboratory sample information

Cases meeting the “suspected case” definition were sampled, and all investigated cases were entered into a centralised line list for analysis.

Data Management and Analysis

Data from the central line list were entered, cleaned, and analysed using Stata version 18.0 (Stata Corp, College Station, TX, USA). Descriptive statistics were used to summarise the outbreak characteristics. Quantum Geographic Information System (QGIS) (v3.30.1) was used to map the Mpox attack rate by districts in the Western Region. Epi Info 7 was also used to draw the Epi-curve for the confirmed Mpox cases in the region. The interquartile range of the ages will be calculated. “The interquartile range (IQR) is the distance between two quartiles”, $(Q3 - Q1)$ [23], where Q1 represents the first quartile, and Q3 is the third quartile.

Public Health Response

Immediate actions included activating the Regional Public Health Emergency Management Committee (PHEMC) to coordinate the multi-sectoral response. Core interventions focused on interrupting transmission and included: case isolation in designated facilities or homes; active contact tracing and identification, listing, and daily monitoring for 21 days; and risk communication targeting schools, mining communities, and the general public to promote early reporting and reduce stigma. Infection Prevention and Control (IPC) measures were reinforced in all health facilities.

A targeted Mpox vaccination campaign was conducted. A reactive vaccination campaign was implemented as a key intervention to contain transmission, focusing on two primary high-risk groups. First, vaccination was offered to identified close contacts of confirmed cases, primarily in seven districts across the Western Region (Effia-Kwesimintsim, Ellembelle, Nzema East, Prestea-Huni Valley, Sekondi-Takoradi, Tarkwa-Nsuaem, Wassa Amenfi East), as part of ring vaccination to create a buffer of immunity and interrupt transmission chains. Second, the campaign targeted high-risk individuals in the seven (7) most affected districts with sustained local transmission, prioritising frontline health workers and other high-exposure groups in these areas.

Logistics and resource mobilisation

Logistics support was centralised through the Western Regional Health Directorate. Critical activities included establishing specimen referral networks with cold-chain support for timely laboratory confirmation, and distributing infection prevention and control (IPC) kits (gloves, gowns, masks, sanitisers) and sample collection kits to all affected health facilities. A dedicated isolation ward was operationalised at the regional hospital, with district hospitals preparing holding bays. Laboratory “PCR

Reaction mix” and Mpox Gene Expert test cartridges for on-site Mpox testing in the Western Region were supplied by the WHO, enabling local diagnosis and eliminating the need to forward samples to the national public health laboratory.

Resources were mobilised from multiple levels to support the response. Intra-governmental resources were reallocated from the regional health budget, and the Ghana Health Service headquarters and the Ministry of Health provided national support. Partner support was secured from the World Health Organisation (WHO) and other agencies, which provided technical assistance, some laboratory reagents, and guidance documents. A key gap and subsequent recommendation were the need for a dedicated emergency fund and pre-positioned stockpiles for future outbreaks.

Communication and Collaboration

Effective multi-sectoral coordination was established by activating the Regional Public Health Emergency Management Committee (PHEMC), which facilitates interagency coordination among health, education, local authorities, and security organisations. Risk communication and community engagement (RCCE) played an important role. Messages on symptom recognition and prevention were disseminated via local broadcast networks, community information vans were deployed to spread the word, and people from traditional and religious backgrounds were engaged as promoters to combat stigma. Technical cooperation remained with the national entities (GHS HQ, NMIMR) for laboratory support and policy advice, and with international partners (WHO) for outbreak analytics and strategic guidance, all of which formed a coordinated response network.

Results

Profile of the Outbreak

From the confirmation of the first Mpox case on 12th May 2025 to 27th November 2025, a total of 1,060 suspected Mpox cases were identified across 14 districts in the Western Region through the line list. Of these, 398 (37.55%) were laboratory-confirmed cases through Real-Time Polymerase Chain Reaction (Real-Time PCR). About 2.55% (27/1,060) of the total cases still had their results pending at the time (Fig. 2).

Epidemiological Descriptive

The outbreak predominantly affected young and middle-aged adults, with 75.63% (301/398) of confirmed cases among individuals aged 18 to 45 years. Confirmed cases among school-aged children (6–17 years) and young children (1–5 years) accounted for 12.31% (49) and 4.52% (18) of the total, respectively. The interquartile range (Upper Quartile (Q3) (32) – Lower Quartile (Q1) (13) is 19 years. A slight male predominance was observed among confirmed cases, with 208 males (52.26%).

Among confirmed cases with occupational data, the majority were engaged in the private sector (227, 57.04%). Pupils and students represented the second-largest group (95, 23.87%), followed by government workers (48, 12.06%). A lower proportion of cases (28, 7.03%) was reported among the unemployed (Table 1).

Among the 398 laboratory-confirmed mpox cases, three fatalities were reported, resulting in a Case Fatality Rate (CFR) of 0.75% (Table 1).

Table 1
Distribution of Confirmed Mpox Cases, Western Region,
2025

Variables	Frequency (398)	Percent
Age Group		
1–5 years	18	4.52
18–45 years	301	75.63
46–60 years	22	5.53
6–17 years	49	12.31
above 60 years	2	0.50
less than 1 year	6	1.51
Gender		
Female	190	47.74
Male	208	52.26
Districts		
Ahanta West	2	0.50
Effia-Kwesimintsim	18	4.52
Ellembelle	46	11.56
Jomoro	1	0.25
Mpohor	0	0.00
Nzema East	16	4.02
Prestea-Huni Valley	12	3.02
Sekondi-Takoradi	115	28.89
Shama	4	1.01
Tarkwa-Nsuaem	84	21.11
Wassa East	2	0.50
Wassa-Amenfi Central	11	2.76
Wassa-Amenfi East	83	20.85
Wassa-Amenfi West	4	1.01
Occupation		

Variables	Frequency (398)	Percent
Age Group		
Government worker	48	12.06
Private worker	227	57.04
Pupil/student	95	23.87
Unemployed	28	7.03
Fatalities	3	0.75

Geographical Distribution of Mpox Attack Rates Across Districts

The outbreak was widespread but unevenly distributed across the region. Three districts accounted for over 70% of all confirmed cases: Sekondi-Takoradi (115 cases, 28.89%), Tarkwa-Nsuaem (84 cases, 21.11%), and Wassa-Amenfi East (83 cases, 20.85%). Ellembele district reported 46 cases (11.56%), while the remaining ten districts collectively reported 70 cases (17.59%) (Table 1).

Also, Sekondi-Takoradi Metropolis recorded the highest attack rate of 115/100,000 population. Tarkwa-Nsuaem Wassa and Amenfi West districts recorded equal attack rates of 84/100,000 and 83/100,000 population, respectively. In comparison, Jomoro District had an attack rate of 1/100,000 population, with no confirmed cases in Mpohor District (Fig. 3).

Magnitude of the Outbreak

The outbreak lasted for over 29 Epi-weeks, from the day the first case was confirmed (Epi-week 19) to Epi-week 48 (Fig. 3). The outbreak had eight distinct peaks, showing a propagated outbreak in the region. A joint team from the Ghana Health Service headquarters and the World Health Organisation joined the regional team to investigate the outbreak on 22nd to 26th September 2025 (Epi-Week 39). The investigation was followed by the introduction of vaccination on October 4, 2025 (Epi-Week 40). A clear downward trend begins immediately one week (Week 40) after the introduction of the vaccine (Fig. 4).

Discussion

The Mpox outbreak in the Western Region began with an index case, a 31-year-old, who was recorded at Tarkwa Municipal Hospital in the Tarkwa-Nsuaem district of Ghana's Western Region on the 12th May 2025. This investigation describes an extensive and sustained mpox outbreak in the Western Region of Ghana that lasted over 29 epidemiological weeks in 2025 (Epi-week 19 to Epi-week 48). This indicates a persistent weekly case reporting throughout the outbreak period, showing continued transmission across multiple epidemiological weeks. This finding is similar to mpox observed in other West African countries, where the mpox outbreak was active for several weeks and months throughout that year [24].

The investigation revealed that young and middle-aged adults (18–45 years) were the predominant group affected, accounting for more than three-quarters of the cases recorded in the region, and most of them were males. The Western Region serves as a key economic hub where diverse groups of people enter. The 18–45 years group and the male demographic represent the core workforce in high-density sectors such as mining, fishing, and health workers, which may elevate their exposure risk through occupational and social close-contact settings [25]. Also, this outcome could also be likely linked to the stoppage of the routine smallpox vaccination in the country, which provided cross-protective immunity against mpox [15], and may explain the reemergence of mpox. This is because children and young adults below 46 years were all born after the discontinuation of the smallpox vaccines [18]. Contrary to our findings, before the 2022–2024 global mpox outbreaks, most endemic African countries included a higher proportion of children, and these were linked to zoonotic spill over [26, 27].

The global outbreak between 2022 and 2024 mainly spread among men who have sex with men, often affecting those living with HIV, as Liu and colleagues showed. However, our study found a different pattern [20, 21, 27]. In our study, the number of men and women affected was almost equal. We also found that cases were linked to people working in the private sector and to school settings. This suggests that in the Western Region of Ghana, mpox is spreading through everyday close contact in homes and communities, rather than through specific sexual networks.

This finding matters for public health. In this part of Ghana, where mpox is already present, efforts to educate and alert the community must focus on preventing close physical contact in daily life, not just on sharing sexual health messages targeted at specific groups [20].

The large proportion of cases among private-sector workers (57.04%) suggests transmission within households and workplaces. This aligns more closely with the traditional and occupational transmission risks described in African settings [21] and the Western Region's status as an economic hub, suggesting that transmission is driven by high-contact occupational and social networks rather than being confined to specific intimate networks [28]. The index case, a small-scale miner with no clear epidemiological or travelling links, further explains the complex, community-based transmission chains that likely fuelled this outbreak, potentially linked to the region's high population mobility for mining and other commercial activities. According to Kivu et al (2024), specific groups such as women and children have a high risk of getting mpox in the mining communities. Women who frequently engage in food preparation of food and handling children are at risk of contracting the MPXV and also transmitting it in the household [29]. Any risk communication and community engagement (RCCE) initiatives must be carefully designed to mitigate the potential for stigmatisation when addressing these vulnerabilities. (DRC) [29]

A critical observation from this outbreak is the low Case Fatality Rate (CFR) of 0.75%. This figure is consistent with the expected mortality range for infections caused by the Mpox virus Clade II, the less virulent West African clade identified in this outbreak [12, 27]. The low CFR starkly contrasts with the devastating outcomes associated with Clade I outbreaks in Central Africa, where CFRs can exceed 10% and primarily affect children [21, 27]. It also contrasts with severe outcomes seen elsewhere among

specific high-risk groups. For instance, while people living with HIV (PLHIV) constituted 38–50% of cases in the 2022 global outbreak, severe disease and death were overwhelmingly concentrated in a subset with advanced immunosuppression (CD4 counts < 200 cells/mm³) [27]. The absence of widespread, severe immunosuppression like advanced HIV in the affected cohort in the Western Region of Ghana likely contributed to the favourable outcomes observed here. Furthermore, the three reported fatalities, while tragic, represent a mortality burden far lower than the 20.8% CFR reported among co-infected patients in some endemic African settings [12]. Similarly, children and pregnant women are susceptible to developing severe complications and fatal outcomes from the disease [29].

The significant spatial heterogeneity of the outbreak, with more than two-thirds of cases concentrated in just three districts (Sekondi-Takoradi, Tarkwa-Nsuaem, and Wassa-Amenfi East), highlights the role of urbanisation, economic hubs, and population density in amplifying transmission. These three districts are urban and reflect population density, economic activity, immigration, and connectivity, which could influence the spread of MPXV in the region. The literature strongly supports that human-to-human contact is the key transmission route in contemporary outbreaks, especially in dense urban settings [30, 31]. Urban informal settlements, characterised by high density, overcrowding, and every day "cultures of caring and intimacy" within families and between neighbours, create frequent close-contact opportunities that can be recognised as high-risk environments for sustained human-to-human transmission and drive spread [30, 31]. This clustering necessitated and justified the geographically targeted public health response, including ring vaccination in these high-burden areas [32]. A 2025 study from the DRC found that an "index of economic well-being" in some districts was positively associated with higher mpox incidence, suggesting that economic activity, rather than poverty alone, can correlate with transmission risk [33].

The prolonged, propagated nature of the outbreak, with distinct peaks, suggests sustained human-to-human transmission, aligning with recent mpox outbreaks in endemic lower-middle-income countries, which are often prolonged and involve complex transmission chains, especially in resource-limited settings with late interventions [15, 34]. The public health response was essential, involving case isolation, contact tracing, risk communication, and a targeted vaccination campaign [32], which aligns with the work of Vivancos et al. to break the chain of community transmission of MPXV [35]. The engagement of a high-level joint mission from the Ministry of Health and the World Health Organisation (WHO) in September 2025 highlights the outbreak's national significance and the importance of coordinated technical and logistical support [28]. However, approximately a 21-week interval between the detection of the first case and the introduction of an intervention (vaccination) highlights a significant gap between detection and decisive intervention, which is a documented challenge in mpox outbreaks in Africa, often due to surveillance delays, diagnostic constraints, and vaccine access inequity [21]. Nonetheless, a clear downward trend in cases began one week after vaccination introduction, which aligns with the work of Du et al., who found that Mpox vaccines provide a longer duration of protection for those who take them, with about 52% likely to protect individuals for a lifetime without getting infected with the MPXV [36].

This study may assist policymakers in enhancing their surveillance systems to protect individuals. However, the study has some limitations. First, the cross-sectional nature of this outbreak provides a snapshot but limits causal inference and clinical understanding. Therefore, future prospective cohort studies embedded within outbreak response are needed to establish causality and document the full clinical spectrum of mpox in this setting. Second, the reliance on retrospective case searches at health facilities likely resulted in missing some affected clients, especially those with mild, subclinical, or asymptomatic infections. Integrating active community serosurveys during outbreaks could provide a more accurate denominator and reveal the extent of silent transmission.

Conclusion and recommendation

The outbreak was characterised by several peaks in the Western Region of Ghana, with community-based human-to-human transmission in an urban occupational hub among the working-age adult population. The eventual decline following a targeted vaccination campaign highlights the critical importance of timely intervention, while the 21-week response gap highlights systemic challenges in surveillance and equitable vaccine access. and a low case fatality rate, which is consistent with the Clade II virus.

To enhance preparedness and response for future mpox outbreaks, a multi-faceted strategy is recommended. This includes establishing year-round, integrated zoonotic surveillance in the Western Region and ensuring regional stockpiles of critical commodities for rapid deployment. Context-specific risk communication must be developed for high-risk occupational groups and institutions, while access to mpox vaccination should be sustained and expanded for vulnerable populations. Finally, formalising partnerships with community leaders and cross-sectoral authorities is crucial to strengthening early warning systems and addressing underlying ecological risks. These actions, informed by the distinct transmission dynamics observed, are critical for building a more resilient public health system capable of interrupting mpox transmission in this endemic region.

Declarations

Acknowledgement

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Author Contributions

MOO, JB, ASO, PA and CA conceptualised the investigation, participated in its design and coordination, initiated the study, interpreted the results, and drafted the final manuscript. They were all involved in data collection, contributed to revising the methods, and provided guidance for the discussion and write-up of the manuscript. All authors contributed to manuscript revision, read, and approved the submitted version.

Ethical approval

This investigation was conducted under the Integrated Disease Surveillance and Response (IDSR) framework, as mandated by Ghana's Public Health Act, 2012 (Act 851). The required administrative permissions were obtained from the National Disease Surveillance Department and the Western Regional Health Directorate before the field study. Ethical protocols were strictly followed, including obtaining informed consent from adults and parental assent for minors, ensuring the right to withdraw at any stage. All collected data were anonymised and securely stored to protect participant confidentiality.

Consent for publication

All authors and participants have agreed to the publication of this manuscript in a peer-reviewed journal.

Conflict of interest

All authors have declared no competing interests.

Data Availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

References

1. CDC A (2022) MONKEYPOX Tech FACTSHEET :1–8
2. Jefferson S, Kohl A, Pena L, Pardee K (2023) Clinical and laboratory diagnosis of monkeypox (mpox): Current status and future directions. *ISCIENCE* 26:106759. <https://doi.org/10.1016/j.isci.2023.106759>
3. Parker S, Buller RM A review of experimental and natural infections of animals with monkeypox virus between 1958 and 2012 2013;8:129–157. <https://doi.org/10.2217/fvl.12.130.A>
4. Arita II, Henderson DA Smallpox and Monkeypox in Non-human Primates 1968:277–83
5. Ladnyj D, Ziegler P, Kima E A human infection caused by monkeypox virus in Basankusu Territory. Democratic Repub Congo * 1972:593–597

6. Ewijk CE, Van, Miura F, Rijckevorsel G, Van, Vries HJC, De, Welkers MRA, Oda E Mpox outbreak in the Netherlands, 2022 : public health response, characteristics of the first 1, 000 cases and protection of the first-generation smallpox vaccine 2022:1–15
7. WHO WHO (2022) Multi-country monkeypox outbreak in non-endemic countries. Factsheet
8. CDC Monkeypox 2025
9. Ilic I, Macuzic IZ, Ilic M Global Outbreak of Human Monkeypox in 2022: Update of Epidemiology 2022
10. Bellua N, Yembedara NA, Dramani A (2025) Modelling of knowledge and attitudes as key determinants of Mpox prevention practices among university students in Ghana: a cross-sectional analysis. *New Microbes New Infect* 67:101615. <https://doi.org/10.1016/j.nmni.2025.101615>
11. Yadav R, Chaudhary AA, Srivastava U, Gupta S, Rustagi S Mpox 2022 to 2025 Update: A Comprehensive Review on Its Complications, Transmission, Diagnosis, and Treatment 2025:1–23
12. Dorcoo C, Gyamfi GO, Kaiser F, Lomotey ES, Sumbah JG, Fischer RJ et al Pre-Clade IIb Mpox Virus Exposure Ghana: Retrospective Serological Anal 2025:1–10
13. Pekar JE, Wang Y, Wang JC, Shao Y, Taki F, Forgione LA et al Transmission dynamics of the 2022 mpox epidemic in New York City 2025;31. <https://doi.org/10.1038/s41591-025-03526-9>
14. McQuiston JH, Braden CR, Bowen MD, Mccollum AM, Mcdonald R The CDC Domestic Mpox Response – United States, 2022–2023 2023;72:2022–3
15. Akingbola A, Adegbesan CA, Adewole O, Idahor C, Odukoya T, Nwaeze E et al (2025) Understanding the resurgence of mpox: key drivers and lessons from recent outbreaks in Africa. *Trop Med Health* 1:1–12. <https://doi.org/10.1186/s41182-024-00678-1>
16. WHO. WHO factsheets on Mpox (2024) <https://www.who.int/news-room/fact-sheets/detail/mpox>
17. WHO (2025) <https://www.who.int/news/item/02-07-2025-who-backed-integrated-testing-model-strengthens-response-to-mpox-hiv-and-syphilis>
18. Ogunleye AY-, Dalhat M, Akinpelu A, Aruna O, Garba F, Ahmad A et al Mpox (monkeypox) risk and mortality associated with HIV infection: a national case – control study in Nigeria 2023:4–10. <https://doi.org/10.1136/bmjgh-2023-013126>
19. Ahmed SK, Mohamed MG, Dabou EA, Abuijlan I, Chandran D, El-shall NA et al Monkeypox (mpox) in immunosuppressed patients 2023:1–29
20. Liu Y, Ge X, Zhang Y, Wang Y, Zhang M, Chen J (2025) Associations Between Both HIV and Metabolic Comorbidity and Self-Reported Mpox Among Men Who Have Sex With Men. *Multicenter Cross-Sectional Study* 11:1–12. <https://doi.org/10.2196/83450>
21. Kangbai JB, Sesay U, Vickos U, Kagbanda F Mpox in Africa: What we know and what is still lacking 2025:1–7. <https://doi.org/10.1371/journal.pntd.0013148>
22. GSS G statistical service Ghana 2021 population and Housing Census 2021:32
23. Whaley DL (2005) Digital Commons @ East Tennessee State University The Interquartile Range: Theory and Estimation

24. WHO Mpox Epidemiological update: Multi-country external situation report 2025:1–11
25. Szkiela M, Wiszniewska M (2023) Monkeypox (Mpox) and Occupational Exposure
26. Kaur R, Gupta S, Pathak S, Sharma M, Parashar D, Sharma BP et al (2026) A Primer on Monkeypox Infection: An Emerging Threat to Global Public Health. Arch Med Res 57:103279.
<https://doi.org/https://doi.org/10.1016/j.arcmed.2025.103279>
27. European Centre for Disease Prevention and Control Factsheet for health professionals on mpox 2024. <https://www.ecdc.europa.eu/en/all-topics-z/monkeypox/factsheet-health-professionals>
28. WHO WHO and Ministry of Health lead joint mission to Western Region in response to Mpox outbreak 2025. <https://www.afro.who.int/photo-story/who-and-ministry-health-lead-joint-mission-western-region-response-mpox-outbreak>
29. Kivu S, Republic D, Kivu S, Ministry TDR, Health P, Kivu S et al Key considerations: Mpox, mining, and vulnerabilities of women and children in eastern. DRC Key considerations 2024:1–15
30. Srivastava S, Sharma D, Sridhar SB, Kumar S, Rao GSNK (2025) Comparative analysis of Mpox clades: epidemiology, transmission dynamics, and detection strategies
31. Schmidt-Sane M, Wilkinson A Key considerations: Mpox response in urban informal settlements Key considerations 2025:1–15
32. GHS. Ghana Health Service Launches Mpox Vaccination Campaign in Takoradi (2025)
<https://ghs.gov.gh/news-and-events/ghana-health-service-launches-mpox-vaccination-campaign-in-takoradi>
33. Lu G, Chong Z, Xu E, Na C, Liu K, Chai L et al Environmental, socioeconomic, and sociocultural drivers of monkeypox transmission in the Democratic Republic of the Congo. : One Health perspective 2025:1–13. <https://doi.org/10.1186/s40249-025-01278-9>
34. Lokossou VK, Ogunyemi KO, Usman AB, Kamdem S, Ahanhanzo CD, Agbla F et al Strengthening the mpox response: how do we balance pragmatism and equity in resource-constrained settings? 2025;15. <https://doi.org/10.7189/jogh.15.03036>
35. Vivancos R, Anderson C, Blomquist P, Balasegaram S, Bell A, Bishop L et al (2022) Community transmission of monkeypox in the United Kingdom, April to May 2022. Eurosurveillance 27:1–5.
<https://doi.org/10.2807/1560-7917.ES.2022.27.22.2200422>
36. Du M, Deng J, Yan W, Zhang S, Wu S, Liu M Public preferences and decision- making for mpox vaccination in the African region: a multinational discrete choice experiment 2026:1–11.
<https://doi.org/10.1136/bmjgh-2025-018942>

Figures

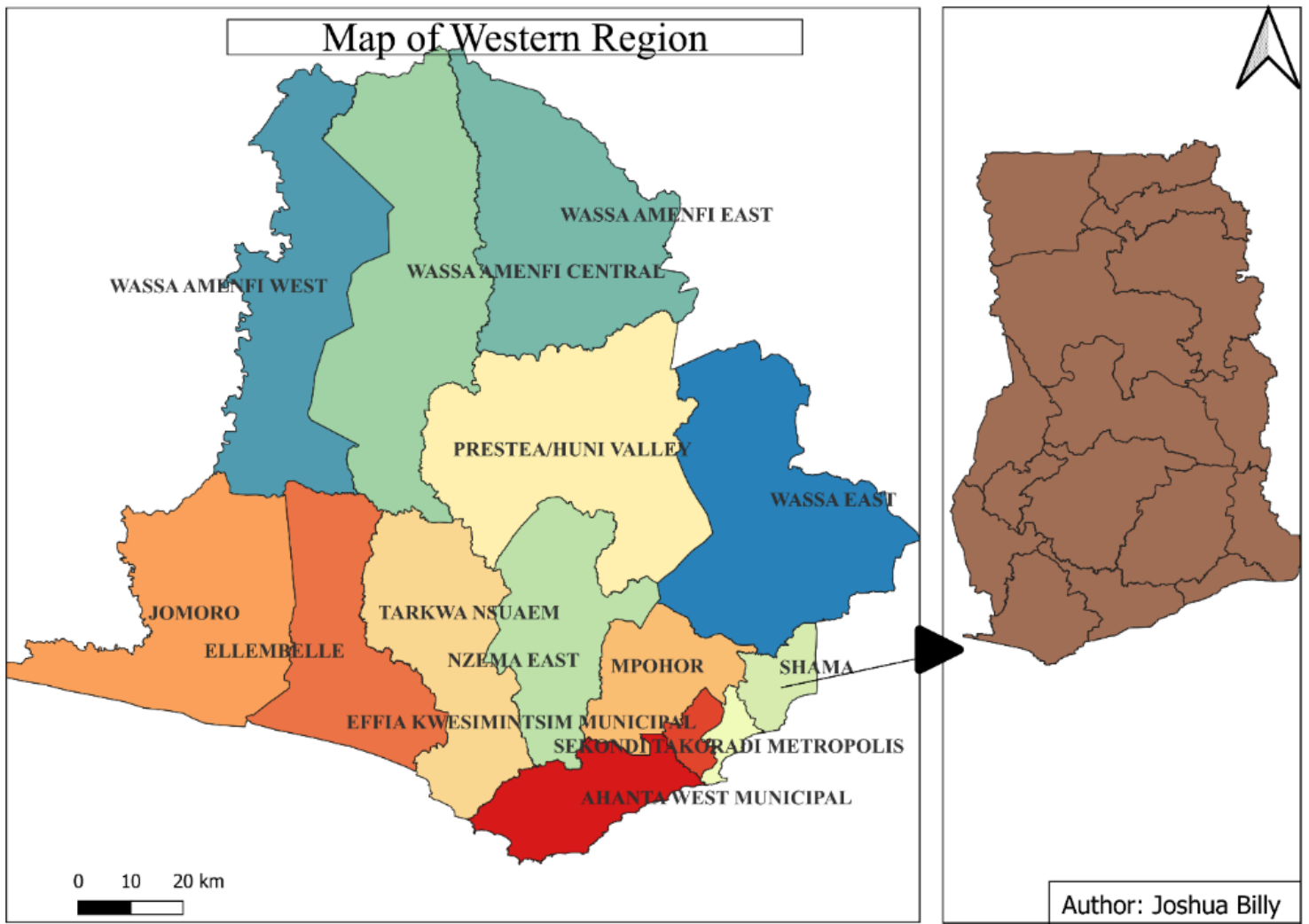


Figure 1

Map of Western Region with Districts

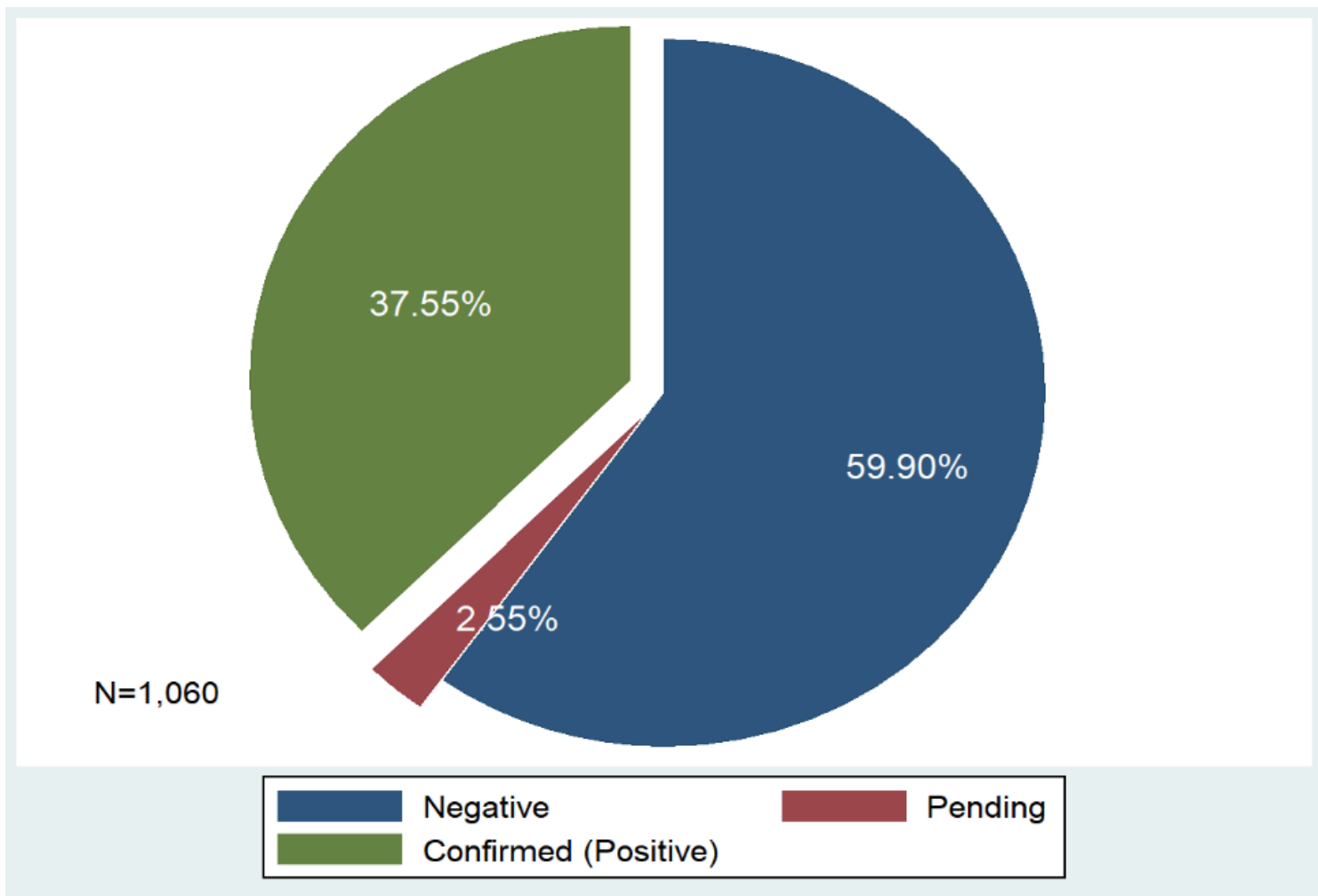


Figure 2

Laboratory results of Mpox Suspected Cases, Western Region

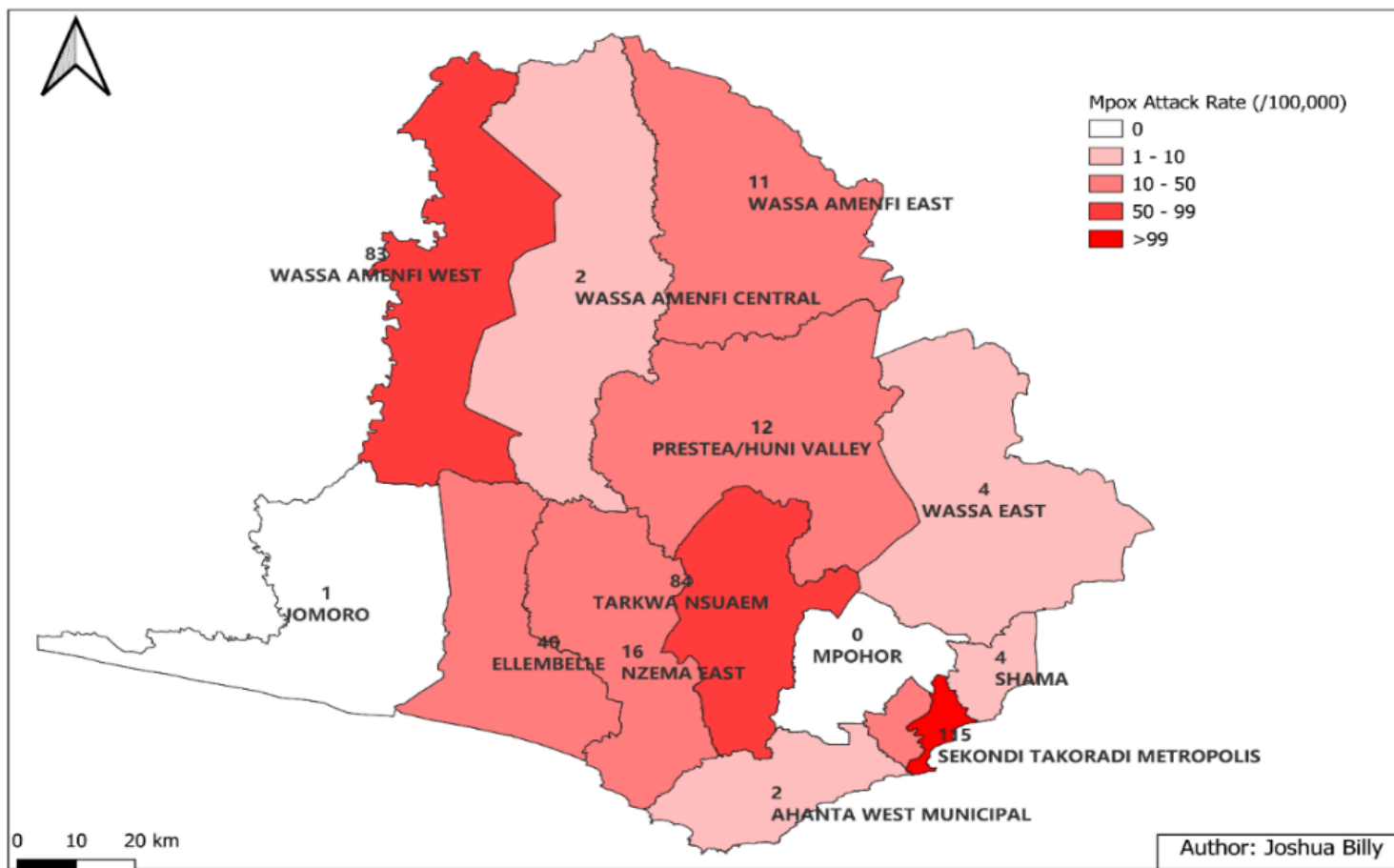


Figure 3

Distribution of Mpox attack rates by districts, Western Region, 2025

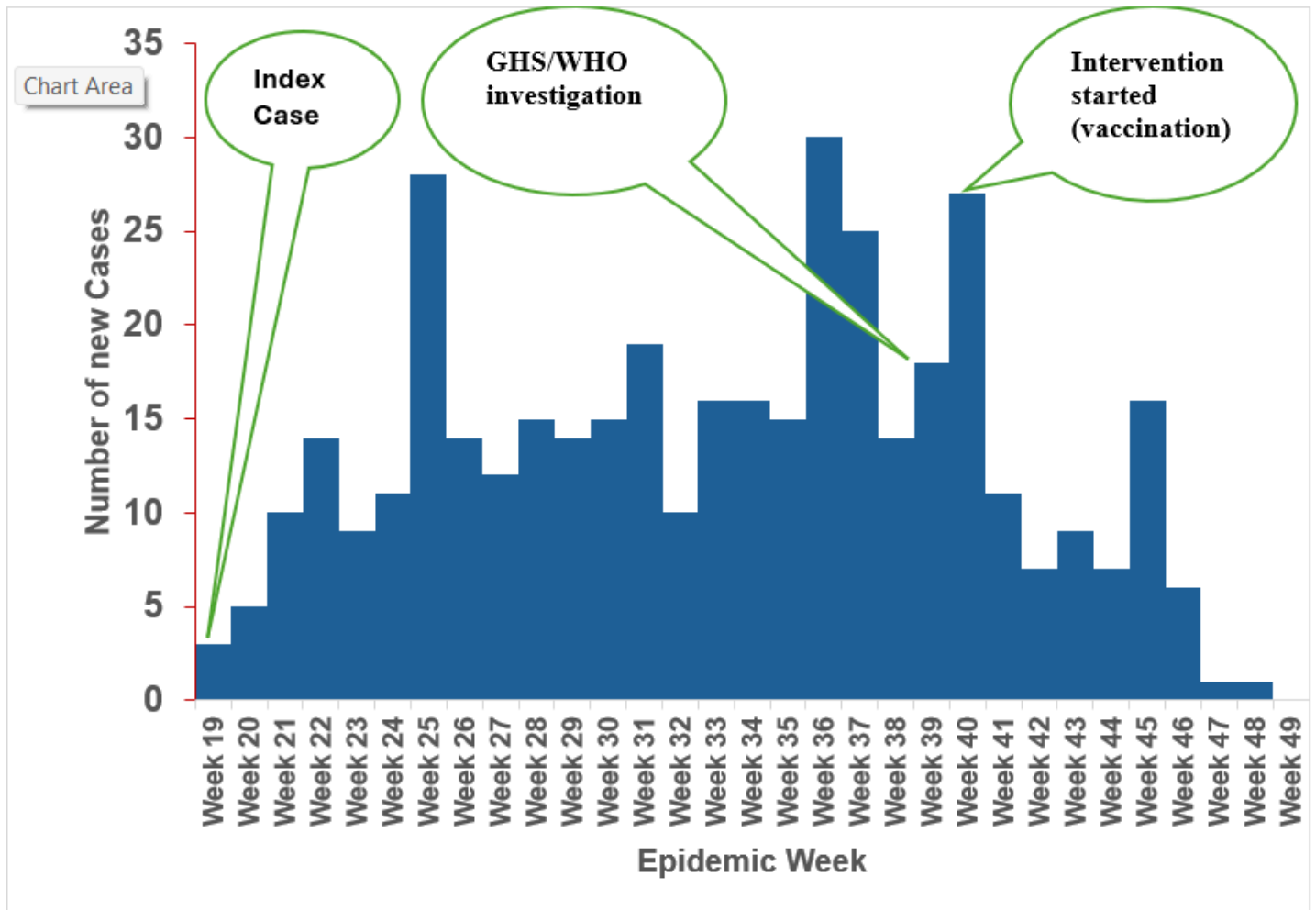


Figure 4

Epidemic curve of Mpox cases, Western Region, 2025